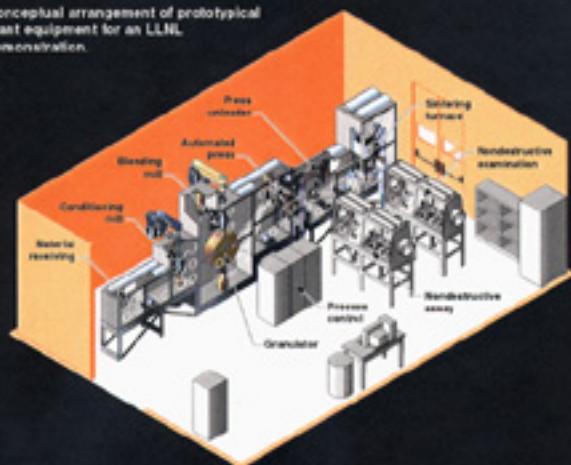


Plutonium Immobilization Program

The Plutonium Immobilization Program (PIP) provides for the safe and secure disposal of surplus weapons plutonium. The ceramification process is part of PIP. It converts the oxides of plutonium into minerals whose natural analogs have contained related elements for thousands of years. NTED supports PIP by supplying engineering expertise to develop the ceramification process. NTED engineers develop equipment to grind, mix, blend, and transport the raw and processed material. A systematic engineering approach is being used to evaluate prototype equipment, processing parameters, and materials. As a result, this project provides engineers with the opportunity to work on new technologies in diverse areas.

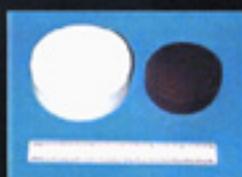
1 Ceramification Subsystem

Conceptual arrangement of prototypical plant equipment for an LLNL demonstration.



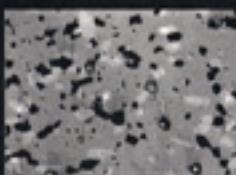
2 Consistent Quality Pucks

Consistent quality pucks are made by reactive sintering. These pucks are expected to last for thousands of years, safely containing their contents and preventing harmful releases to the environment.



3 Scanning Electron Microscope Image

This SEM image of a HI-Pu-U puck shows the morphology involved with ceramification. The pucks contain minerals common in nature. Scientists and engineers study these images to optimize the ceramification process.



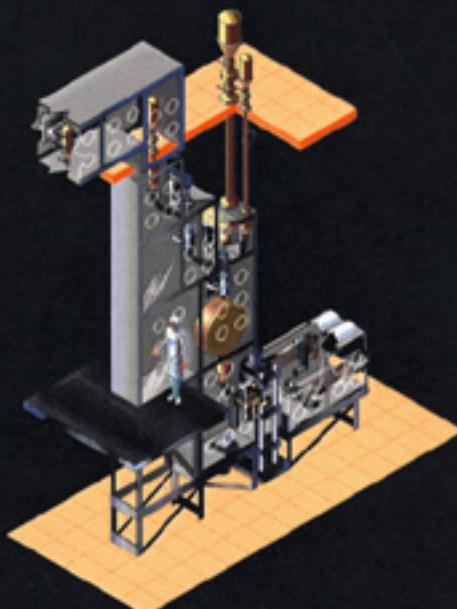
4 Robotic "pick-n-place" Device

The pick-n-place rapidly transports both green and fired pucks between the press, sintering furnace, and inspection stations. Engineers are designing the robot to measure puck density.



5 Plant Arrangement

This artist's concept shows how the Plutonium Immobilization Program's ceramification section equipment will appear in a production plant. This vertical arrangement utilizes gravity for powder transfer.



6 Can-in-Canister

The can-in-canister system is designed to address environmental, nonproliferation, and safety concerns. Pucks are placed in a can, which is placed in the canister. The canister is then filled with borosilicate glass containing high-level waste. Depicted below is the proposed internal structure of the canister, which holds the cans of pucks in place.

